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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,407	06/09/2006	George Gruner	58086-232072	1100

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EXAMINER	
MILLER, DANIEL H	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,407	GRUNER, GEORGE	
	Examiner	Art Unit	
	Daniel Miller	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/20/2007, 6/9/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 12-16, and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kymakis (Applied Physics Letters Volume 80, No. 1, January 7, 2002 pgs. 112-114).

3. Kymakis teaches the optoelectronic properties occurring in single-walled carbon nanotubes (SWNTs)--conjugated polymer, poly(3-octylthiophene) composites. Composite films were drop or spin cast from a solution on indium-tin oxide (ITO) and quartz (or glass) nonconductive substrates and studied using absorption spectroscopy and electrical characterization methods (abstract and figure 1). The polymer is inherently semiconducting as claimed (see pg. 112). Opposing electrodes are present in Diodes (Al/polymer-nanotube composite/ITO) with a low nanotube concentration (1%) show photovoltaic behavior with an open circuit voltage of 0.7-0.9 V (see figure 1). There is a circuit current in the polymer diodes formed from the nanotube/polymer cells. The composite undergoes photo-induced electron transfer at the polymer/nanotube interface (abstract). Regarding claim 4The interaction between the nanotubes and the polymer allows for electron transport (pg. 114). Regarding claims 12, 20-21, the conjugated polymer-SWNTs composite represents an alternative class of organic

semiconducting material that can be used for photovoltaic cells (solar cell) with improved performance (abstract). Therefore, the material is considered light activated as claimed (see 112-114 generally).

4. Claims 1-5, 12-16, and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Curran (Advanced Materials 1998, 10, No.14).

5. Curran teaches a poly(m-phynylenevinyllene-co-2,5-dioctoxy-p-phenylenevinylene) otherwise known as (PmPV) which is a (light activated) luminescent polymer. The (PmPV) polymer is in a helical shape and wraps around the carbon nanotube composite (pg. 1091). The polymer is poorly conductive or non-conductive as claimed (pg. 1093). The polymer conformation allows for bond interaction between the polymer and the carbon nanotubes (nanostructures) (pg. 1091). The material can be exposed to light using a laser and the Electrical conductivity is measured using opposing Pt. Electrodes. Further, the material can be used for an LED by casting the composite in between an (ITO) and aluminum electrode (bottom of pg.1091) meeting the claimed electrical structure of applicant's claims.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-5, 12-16, and 20-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Smalley (US 7,008,563).

7. Curran; Advanced Materials 1998, 10, No.14 cited for evidentiary purposes for properties of the polymer material.

8. Smalley teaches carbon nanotubes (single walled nanostructures) that are wrapped and can be embedded (surrounded) by a polymer (nanostructured) material (see claims 1-4 ref.). The polymer can be PVP or other similar compounds as claimed (see Examples 9 and 13). The polymer is inherently a non-conductive material (see Curran; Advanced Materials 1998, 10, No.14 for evidence of material properties). The plurality of nanotubes can be in bundles electrically isolated or in a rope consistent with applicants claims (claims 9-11, and 30 of ref.). The material is a dielectric layer that can be placed between two electrodes and given an electrical connection (see Example 13). Given the substantial similarity in material and structure the material would be expected to inherently function as claimed with respect to light reactivity.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kymakis (Applied Physics Letters Volume 80, No. 1, January 7, 2002 pgs. 112-114) in view of Duan (US 7,064,372).

11. Kymakis teaches a semiconducting material used for a photovoltaic cell, but does not teach a gate electrode or two such layers set up as p and n type semiconducting layers next to one another.

12. However gate electrodes are commonly employed in many semiconductor application including those with nanostructured applications. Further it is very commonly known to one of ordinary skill that simple diodes and transistor designs employ layered p and n doped semiconductive layers and that such layers can be done with doped carbon nanotubes (see Duan US 7,064,372 generally for an exhaustive discussion of such devices). Therefore, given the teachings of the layer of Kymakis, it would have been obvious to one of ordinary skill in the art to employ a gate electrode or the doped layers as claimed by applicant using the semiconductive layer of Kymakis because the claimed structures are commonly known and used structures for semiconductor application like Kymakis in the art.

13. Claims 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smalley (US 7,008,563) in view of Duan (US 7,064,372).

14. Smalley teaches a semiconducting material, but does not teach a gate electrode or two such layers set up as p and n type semiconducting layers next to one another.

15. However gate electrodes are commonly employed in many semiconductor application including those with nanostructured applications. Further it is very commonly known to one of ordinary skill that simple diodes and transistor designs employ layered p and n doped semiconductive layers and that such layers can be done with doped carbon nanotubes (see Duan US 7,064,372 generally for an exhaustive discussion of such devices). Therefore, given the teachings of the layer of Smalley, it would have been obvious to one of ordinary skill in the art to employ a gate electrode or the doped layers as claimed by applicant using the semiconductive layer of Smalley because the claimed structures are commonly known and used structures for semiconductor application like Smalley in the art.

16. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kymakis (Applied Physics Letters Volume 80, No. 1, January 7, 2002 pgs. 112-114) in view of Ramamurthy (composite electronic device).

17. Kymakis, discussed above, is silent as to the presence of polyanaline in the nanostructured layer.

18. Ramamurthy teaches a substantially similar layer formed from carbon nanotube (nanostructures) and a polyanaline nanostructure.

19. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a polyanaline polymer in stead or in addition to the polymer of

Kymakis because both are known in the art to from substantially similar transparent electrical layers and diodes (see Ram. Pg.208).

20. It would further be obvious to combine the materials because It has been held that "it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

21. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kymakis (Applied Physics Letters Volume 80, No. 1, January 7, 2002 pgs. 112-114) in view of Occhipnti (US 2004/0027889).

22. Kymakis, discussed above, is silent as to the presence of rhodopsin.

23. Occhipnti (US 2004/0027889) teaches rhodopsin is a particular bacterium protein that is useful for electrical applications due to its color change when exposed to light [0015-0017].

24. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide rhodopsin in the diode of Kymakis because of its known color changing properties when exposed to light in the light sensitive material of Kymakis.

25. It would further be obvious to combine the materials because It has been held that "it is prima facie obvious to combine two compositions each of which is taught by

the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

26. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curran (Advanced Materials 1998, 10, No.14) in view of Occhipnti (US 2004/0027889).

27. Curran (Advanced Materials 1998, 10, No.14), discussed above, is silent as to the presence of rhodopsin.

28. Occhipnti (US 2004/0027889) teaches rhodopsin is a particular bacterium protein that is useful for electrical applications due to its color change when exposed to light [0015-0017].

29. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide rhodopsin in the diode of Curran because of its known color changing properties when exposed to light in the light sensitive material of Curran.

30. It would further be obvious to combine the materials because It has been held that "it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from

their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Miller whose telephone number is (571)272-1534. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Daniel Miller

JOHN J. ZIMMERMAN
PRIMARY EXAMINER